

REMARKS

The amendment to claim 2 is supported by the application as filed, page 13. Claims 4 and 7 have been cancelled. New claims 9, 10, 18 and 19 are supported by the application as filed, page 11. New claims 11 and 19 are supported by the application as filed, page 13. New claims 12 and 21 are supported by the application as filed, page 9. New claims 13 and 22 are supported by the application as filed, page 14. Claim 14 is supported by cancelled claim 7. Claims 15 and 16 are supported by claims 3 and 4, respectively. No new matter has been added. Upon entry of this amendment, claims 2, 3, 5, 6 and 9-22 are present and active in the application.

Applicants thank Examiner Mayekar for the courteous and helpful discussion held with applicants' representative on June 8, 2009. During this discussion, applicants' representative pointed out that Sheer et al. (U.S. 4,181,704) only suggests the formation of sulfides, sulfates and sulfite. Aspects of the section 112, second paragraph rejection were also discussed.

Methods for transferring energy to a precursor material by exposing it to a plasma are known. For example, precursor material may be introduced into a plasma at any point, such as at any point of the arc column, or at the anode. However, the synthesis of materials with controlled surface chemistry by exposing a precursor material to a plasma has not been described.

The present invention makes use of the discovery that stoichiometrically-nanostructured materials may be produced by the "active volume" of a plasma. The "active volume" in a plasma is created by introducing an oxidizing gas into the plasma, before the plasma is expanded into a field-free zone, either (1) in a region in close proximity to a zone of charge carrier generation, or (2) in a region of current conduction between field generating elements, including the surface of the field generating elements. The "active volume" is the most reactive part of the plasma and material synthesized in the "active volume" has unique surface chemistry. As now claimed, the stoichiometrically-nanostructured material produced is an oxide.

The rejections of the claims under 35 U.S.C. 102 over Sheer et al. (U.S. Pat. No. 4,181,704) in light of U.S. Pat. Nos. 3,644,781 or 3,900,762 (hereafter US'781 and US'762) or under 35 U.S.C. 103, over Sheer et al. alone or in view of Deegan et al., are

respectfully traversed. Sheer et al. only suggests forming and recovering sulfides, sulfites and sulfates, not oxides.

Sheer et al. describes a process for the removal of sulfurous gases from the emissions of chemical processes. This reference notes that sulfurous gases in the effluents of important industrial processes are undesirable, and solutions to this emission problem are either very expensive or have serious drawbacks (col. 1). Sheer et al. describe a different method to remove sulfurous gases: injecting into the sulfur-containing gas stream the effluent of a high energy transfer zone, such as an electric arc device, into which a carrier gas flows containing entrained solids (col. 2, lines 36-44). The solids contain simple or complex metal oxides (col. 2, lines 44-47). The electric arc device produces a jet of hot effluent that contains metal oxide vapor, produced by injecting a working gas, such as air, CO and/or H₂, entrained with complex or simple oxides of metals, into the high energy heat transfer zone (col. 3, lines 19-32). The oxide vapor then condenses into ultra-fine, highly reactive fumes, which react with the sulfur gases, to produce solid particles of metal sulfides, sulfites or sulfates (col. 3, lines 33-39). The solid particles are then collected from the gas stream by bag filters, electrostatic precipitators, etc. (col. 3, lines 40-43). There is no description of collecting or recovering oxides; the only products recovered are metal sulfides, sulfites or sulfates.

US'781 and US'762 are both mentioned in Sheer et al. as describing ways for producing a hot effluent stream containing metal oxide vapor (see Sheer et al., col. 4, lines 5-8). Deegan et al. has been cited for showing a free-burning electric arc with reversed polarity.

The claims now specify recovering stoichiometric-nanostructured material, where the stoichiometric-nanostructured material is an oxide. Sheer et al. only suggests recovering sulfides, sulfites and sulfates. Modification of Sheer et al. to recover an oxide would defeat the purpose of the process of Sheer et al., the removal of sulfurous gases from the emissions of chemical processes. Accordingly, there would be no reason to modify Sheer et al. to recover an oxide. Applicants submit that the claimed invention is neither anticipated by, nor obvious over, the applied references. Withdrawal of these grounds of rejection is respectfully requested.

The rejection of the claims under 35 U.S.C. 112, second paragraph, has been obviated by appropriate amendment. Withdrawal of this ground of rejection is respectfully requested.

Applicants submit that the application is now in condition for allowance. Early notice of such action is earnestly solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to be 'P. Rauch', with a long horizontal line extending to the right.

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